

# **MEETING REPORT**

## **26 February 2003 Science Advisory Panel Meeting East Contra Costa County Habitat Conservation Plan / Natural Communities Conservation Plan**

Prepared and reviewed by the Science Advisory Panel: Lynn Huntsinger (chair), Barbara Ertter, Alan Launer, Susan Orloff, Bruce Pavlik, Scott Terrill, and Erica Fleishman (facilitator)

### **INTRODUCTION**

This report serves as the meeting record for the third Science Advisory Panel (Panel) meeting for the East Contra Costa County Habitat Conservation Plan / Natural Communities Conservation Plan (HCP / NCCP). The report was prepared by the chair and facilitator of the Panel. The chair ensured that the scientific views of the Panel were articulated clearly. The facilitator served in an editorial capacity to ensure that the report was clear and responded explicitly to the issues and questions raised by the Habitat Conservation Plan Association (HCPA) Team. All Panel members have had the opportunity to review this document.

The body of the report contains comments from the Panel and, where applicable, responses of the HCPA Team to the Panel's requests for clarification on various issues. Two Appendices are attached. Appendix 1, prepared by Bruce Pavlik, addresses principles for adaptive management and associated monitoring. Appendix 2 summarizes the comments from the public.

The 29 May Panel meeting began at 11:00 A.M. In addition to the Panel members, attendees included Erica Fleishman (facilitator), John Kopchik and Abby Fateman (Contra Costa County), David Zippin and Steve Henderson (Jones & Stokes), Carl Wilcox, Brenda Johnson, and Janice Gan (California Department of Fish and Game), and Sheila Larsen and Vicki Campbell (U.S. Fish and Wildlife Service). Also present were Rebecca Young (note-taker) and four members of the public (John Hopkins, Brad Olson, Peter Rausch, and Richard Vermeer).

The Panel discussed outcomes from the 20 September 2002 Panel meeting, and answered a synthesized set of questions submitted by the Coordination Group and other members of the public in September 2002.

Most of the discussion during the meeting focused on three sets of issues:

1. Biological goals and habitat models
2. Preliminary draft alternative conservation strategies
3. Adaptive management

Following a public comment period, the meeting adjourned at 2:45 P.M.

## **PRELIMINARY DISCUSSION AND UPDATES**

Fleishman reviewed the objectives for the third and fourth meetings of the Science Advisory Panel. In addition to reports from each meeting, the Panel agreed to produce a final report that summarizes guidance from all four meetings grouped by subject as opposed to chronology.

Fleishman noted that the 26 February meeting, Meeting #3, should focus on issues related to conservation strategies, monitoring, and adaptive management. Discussion is planned as an open forum for addressing both (1) broad concepts and questions related to conservation and land-use planning and (2) potential aspects of the draft conservation strategy. In some cases, the Panel may use the preliminary draft conservation strategy as a springboard for discussion. The Panel also will be asked to provide input on several specific questions related to conservation measures for individual covered species.

Meeting #4 will serve several functions, potentially including, but not limited to, a wrap-up on all scientific issues related to the HCP / NCCP; an opportunity to explore new questions and revisit previous concerns related to covered species, natural communities, and existing data; a more detailed examination of monitoring and adaptive management; and an informal assessment of the effectiveness of the science advisory panel process relative to HCP / NCCP in general and the East Contra Costa County HCP / NCCP in particular. Based on the tentative schedule for developing the HCP and the schedule constraints of the Panel members, the fourth Panel meeting most likely will be held in early September 2003.

David Zippin and John Kopchik described several of the outcomes based on feedback received from the Panel at the 20 September 2002 meeting. For example, biological goals and habitat models have been revised, and additional funds are being solicited to help fill certain data gaps and revise some aspects of the land cover maps.

Fleishman and the HCPA Team introduced a proposed method for filling data gaps that capitalized on the Panel's willingness to contribute records on covered species. The method is based loosely on the California Natural Diversity Database. Each member of the Panel received a packet of 13 maps (aerial photographs with overlays of major roads) that collectively covered the entire study area for the HCP / NCCP. Panel members also received an index to the maps and forms and instructions for submitting records of species occurrence in the study area. Panel members were asked to send these records to Fleishman by 21 March 2003; she will collate the records and forward them to the HCPA Team. Panel members also may contact Fleishman to request that sets of maps be sent to colleagues who have additional information on occurrence of covered species in the study area. The HCPA Team will rely on the Panel's expertise to ensure that records are credible.

At the Panel's request, John Kopchik provided a brief update on the HCP process as a whole, including a definition of the permit area, the Coordination Group's agreement to a hybrid mapping approach, and the current status of funding and fundraising efforts.

**The Panel commented on four questions synthesized from documents submitted by the Coordination Group and other members of the public in September 2002.**

1. Is the land-cover mapping process adequate to determine the status of vegetation types within the project area? Do the land-cover classes accurately describe major vegetation types in the project area?

This question is difficult to answer because the definition of vegetation types is subject to professional judgment, and to some extent the status of vegetation types also is subject to judgment. The answer depends on the goals of the vegetation categorization or land-cover mapping process, and each member of the Panel might answer the question differently. The best way to address this question is with respect to specific habitat requirements and concerns—it is a question that must be answered as we continue to develop the HCP. Land-cover mapping for this HCP was somewhat opportunistic. The methods were reasonable in light of financial constraints, but ideally the Panel would have been involved at the earliest stages in the land-cover mapping process. The land-cover classes represent fairly well the areas with high concentrations of species of particular interest or concern. Data gaps probably will be closed in the future as new data on distributions of covered species become available.

2. Are Panel members aware of any locally rare species (i.e., rare within the planning area) that have not been covered under the draft HCP / NCCP?

*Erodium macrophyllum* is not yet covered, but it will be added to the list of covered species if the HCPA Team is successful in raising sufficient funds. It would be helpful to compile lists of plants that are locally rare, such as species that occur in alkali wetlands. This information could be useful for assessing protection at the ecosystem level or “habitat” level.

The planning process should take advantage of the extensive work done by the Unusual Plants committee (coordinated by Dianne Lake, 510 741-8066) of the East Bay Chapter of the California Native Plant Society.

3. What is the probability that the proportion of native annual grasses can be increased by management actions? Do the alternative conservation strategies include such actions?

Management efforts rarely are directly explicitly toward native annual (as opposed to perennial) grasses. Native annuals are sparse in most of the inventory area, but may flourish on endemic soils where there is little competition from non-native annuals. They are well adapted to disturbance, and management to increase their abundance on sites where they are present may prove detrimental to native perennials that also are likely to be present on endemic soils.

Some of the conservation strategies in the HCP are thought to have potential to increase the proportion of native perennial grasses that commonly co-occur with annual grasses in local grasslands. However, the potential for increasing the proportion of native perennials

seems to be linked closely to site characteristics at relatively small scales, including soils, moisture, mulch levels, patterns of disturbance, and overstory. If increasing the proportion of perennial grasses becomes a goal of the HCP, an appropriate first step would be to identify sites where the probability of success is high. Numerous publications provide some insight into the characteristics of such sites, but from a practical standpoint, the easiest way to identify such sites is to locate areas that already have a substantial proportion of native perennials.

The apparent assumption that native annual grasses were at one time a major ecosystem component seems unlikely given the limited number of native annual grass species. However, it is probable that native annuals other than grasses, especially clovers, were once significantly more abundant, and management that would further the restoration of the former abundance and diversity of native annuals would be desirable. In general, it would be highly desirable to monitor multiple species beyond the targeted covered species.

In broad terms, it may be possible to increase the proportion of native annual grasses through management, but little research has been done in this area. Potential alternative conservation strategies include several methods for increasing the proportion of native perennial grasses in locations with suitable environmental attributes. However, many management techniques for increasing the proportion of native grasses are available beyond those included in the HCP, particularly if annual species of plants in addition to grasses are considered.

4. Are the alternative conservation strategies likely to facilitate maintenance of woody debris within oak woodlands, disturbance processes necessary to maintain riparian woodland and scrub, and native shrubs and forbs?

This question assumes that certain biological goals and objectives are included in the HCP and therefore is difficult to answer. The Panel could look into this issue in more detail at a later date if the HCP includes those goals.

## **BIOLOGICAL GOALS AND HABITAT MODELS**

### **• What are the most critical ecological relationships between covered species and their resources?**

1. Control of non-native invasive plants may not have been addressed as fully as possible. Control measures could help compensate for impacts of human land-use or prevent further degradation of natural communities. For many native plants, invasion of non-natives effectively represents a loss of habitat. This question is quite broad, and responses beyond the most general need to be site-specific and / or species-specific.

2. The objectives for avian species are on target.

3. The Panel asked whether the HCPA Team intended to minimize the contribution of fire as a disturbance. Draft documents currently include few references to prescribed fire and fire management. The HCPA Team clarified that there has been no intent to minimize discussion of fire management per se. The use of fire has not been emphasized as a management tool for chaparral, but is being actively considered as a management tool for grasslands. The Panel encouraged the HCPA Team to be proactive in recognizing that some natural communities within the planning area are fire-dependent, and to emphasize fire as a potential management tool. Ideally, reserves created by the HCP will be sufficiently large that application of fire will be suitable. In general, consideration of potential management strategies should be incorporated into the process of reserve design.

4. In some cases, strategies presented in the sections within Biological Goals and Objectives (Chapter 1) seem to contradict some conservation strategies (Chapter 6). In fact, several of the goals and objectives are not goals and objectives but instead describe management strategies. The conservation strategies have more scientific support than the biological goals and objectives, and include citations from the scientific literature in support of recommended approaches. Many of the goals and objectives are too sweeping or unclear, and do not provide standards against which to measure success or attainment.

a. For many natural communities, it is possible that the introduction of new or revised management practices can help to meet the biological goals of the HCP. The draft conservation strategies describe and discuss such options. Changes in management should be carried out within an adaptive management framework that recognizes the possibility that such changes will have unintended or unanticipated effects on covered species. Reserve design should take into account preservation of options for management such as prescribed fire, livestock grazing, and active restoration efforts.

b. For example, Objective 1.6 currently is “Enhance natural wetlands within preserves by limiting or eliminating livestock access.” A more appropriate objective might be “Enhance natural wetlands within preserves through management.” Even better would be to incorporate a more detailed definition of “enhancement”—what could be measured to evaluate whether objectives have been achieved? Similarly, Objective 1.7 currently is “Within preserves, improve the functioning of stock ponds for covered species by draining them annually to remove exotic species and by limiting access by livestock.” A more appropriate objective might be “Within preserves, improve the functioning of stock ponds for covered species by removing or reducing exotic species and through application of appropriate conservation strategies and management techniques.” Options and methods for improving the status of covered species should be developed in the conservation strategy, and the conservation strategy should more fully explain correlations between potential management alternatives and covered species. The definition of “improved functioning” also needs to be clarified, and might assist the Panel and HCPA Team in setting goals or developing measures to gauge success. How will “function” be measured?

c. In addition to irrigated agriculture, grazed “natural communities” also should be targets of conservation easements. In fact, the “natural communities” in the plan have been

affected by and managed under an agricultural regime (ranching / livestock grazing) for 100-200 years. If we determine that an agricultural regime like ranching is required to maintain some species (as is stipulated for croplands), it may be important to use easements as a means to facilitate maintenance of agriculture in the form of ranching as a land-use or management option. This will also entail consideration of the probability that a community of livestock producers will continue to be available in the area.

5. The Panel raised several concerns regarding the objectives for San Joaquin kit fox.

a. There are few quantitative guidelines with respect to corridors. It is important to realize that corridors can have a negative effect and can function as population sinks. There are two kinds of corridors. (1) Temporary corridors for dispersal typically are no more than several miles in length and can be as narrow as 0.5 miles. (2) Permanent corridors that link patches of habitat should be at least a mile wide and can be longer than several miles. Permanent corridors must be able to support kit fox in the corridor itself; habitat quality must be greater than within a typical dispersal corridor.

b. The four corridors that have been proposed are five miles in length, and up to 0.5 mile in width. They are too long for average dispersal movements but too narrow to support kit fox home ranges permanently. This creates a dilemma because San Joaquin kit fox in the planning area do require corridors. Habitat quality of these corridors should not be high enough to encourage long-term residence because the kit fox are likely to be removed by predators, but entrance to the dispersal corridors could be facilitated by improving habitat quality at the entrances to the corridors. For example, rock piles and cover boards could be used to encourage colonization of the corridors by ground squirrels that serve as prey for kit fox. Six-inch, above-ground pipes can be placed within the corridors to provide kit fox with cover from predators. Artificial sources of cover from predators and dens can improve the status of kit fox in locations in which their ranges have been restricted. It also may be possible and appropriate to improve the quality of kit fox habitat in parts of corridors that are relatively wide. This is not an optimal scenario—0.5 mile width is minimal considering the length of these corridors—but such a strategy may be the best-case given the extent to which the planning area has been developed. Patches of kit fox habitat do need to be connected. A patch area of five square miles is the bare minimum, but again our options are constrained by previous development.

c. Restricting protection of suitable habitat to locations in which kit fox have been documented within the past ten years will eliminate many records that were documented in the late 1980s and 1990s. A ten-year window may be too restrictive. A 15-year window may be more suitable.

6. The plan's emphasis on populations of plants is good, but more attention should be paid to apparently suitable but unoccupied habitat. Distributions of some species may shift over time, and many annuals are present in the soil seed bank.

7. The plan should take into account links between the status of covered species and historical land uses, such as long-term livestock grazing. We cannot make assumptions about the effects of historical land uses practices on covered species and their resources. Little information is available about historical land use practices, but changes should be cautious, as any change in long-term management patterns will mean tradeoffs. Species that flourish in one land-use situation may fare less well in another and vice-versa, and we do not always understand fully the connections between land use and species-level responses.

**• Are you aware of any new sources of biological information or advances in conservation biology that are relevant to biological goals, conservation strategies, and management strategies for covered species and natural communities?**

1. A student at University of California, Santa Cruz is developing a management-oriented Ph.D. thesis on Santa Cruz tarplant. David Zippin will attempt to obtain a copy.

2. Elizabeth Zacharias, a graduate student at the University of California, Berkeley, is working on the phylogenetics of *Atriplex*. Her research is still in the preliminary stages, but Barbara Ertter has notified her that any information on the status of *A. depressa* (brittlescale) and *A. joaquiniana* (San Joaquin spearscale), especially in eastern Contra Costa County, would be of value. For the latest taxonomic evaluation of manzanita, especially regarding the identity of *A. manzanita* in the East Bay, contact Mike Vasey at San Francisco State University. Bruce Baldwin at University of California, Berkeley has been working on *Blepharizonia* (tarplant) and *Madia*, with results that could alter the status of species of these genera in the HCP (i.e., the species may be more rare than previously understood). Bob Preston of Jones & Stokes has been working with Baldwin and is aware of additional populations of Big Tarplant that have not been indicated in the HCP documents thus far.

3. A newly-published flora of Mount Diablo may be useful, especially with respect to Mount Diablo manzanita.

4. Biological goals for California tiger salamanders may be out of date. Recent studies have detected hundreds of salamanders well over 0.5 miles from breeding sites.

5. A paper in press in *Conservation Biology* on the impacts of livestock grazing on native forbs, authored by Greg Hayes and Karen Holl (University of California, Santa Cruz), was circulated to the HCPA Team.

## **CONSERVATION STRATEGIES**

**• Based on life history and ecology, are there logical ways to group covered species in the process of designing a conservation strategy, monitoring, and adaptive management?**

1. It may be possible to develop management guilds based on life history characteristics. A few studies have suggested that it may be possible to manage suites of species with similar life

histories in the same way. A potential approach is to categorize species according to habitat and then by life history (e.g., summer annuals, winter annuals).

2. Mount Diablo manzanita, Diablo helianthella, Mount Diablo fairy lantern, and Brewer's dwarf flax may co-occur.

3. *Atriplex depressa* (brittlescale), *A. joaquiniana* (San Joaquin spearscale), and *Delphinium recurvatum* (recurved larkspur) are likely to co-occur, along with a suite of non-covered locally significant species of alkali areas. A different suite of non-covered locally significant species (e.g., species of *Navarretia*) are likely to co-occur with the silvery legless lizard in appropriate sandy areas.

4. There may be ecological linkages between ground squirrels, California tiger salamanders, and western burrowing owls.

5. If a management guild approach is considered, it may be possible to protect additional species of concern that are not covered by the HCP. For example, it may be possible to conduct surveys for suites of species as opposed to conducting independent surveys for each covered species.

**• What current and potential threats to natural communities and to covered species, especially human land uses, can be addressed most effectively in the context of the HCP / NCCP, especially through adaptive management?**

1. Non-native invasive species are among the most substantial threats. The extent and magnitude of these threats is considerable and is beyond our ability to control entirely. However, some level of management in the context of the HCP could greatly benefit natural communities and covered species.

2. It might be useful to develop a list of currently known invasives in the planning area. Lists of non-native invasive species developed by the California Exotic Pest Plant Council may be a good place to start. These lists categorize invasive species and potential control strategies.

3. *Lepidium latifolium* (perennial pepperweed) has high potential for devastating natural habitats. Efforts to locating and eradicate this species might be worthwhile. *Dittrichia graveolens* (stinkweed) is not recorded in the Jepson manual, but already has been recorded in the planning area.

4. New invasives are likely to colonize the planning area on a regular basis. Adaptive management will be critical for minimizing these threats. The long-term managers of the adaptive management program should monitor existing known invasives and potential threats—i.e., non-native species that have not yet invaded extensive areas but may do so in the near future.

4. Weed management typically is restricted to well-documented species on existing lists developed by management agencies. There should be a mechanism in the adaptive management

process that allows scientific input on non-natives that are just starting to invade the area (similar to the potential threats just mentioned).

5. The well-established Alameda-Contra Costa Weed Management Area (A-CC WMA) is already actively coordinating efforts to control noxious weeds, including *Lepidium latifolium*, within the HCP area. Any weed management within the HCP framework should be coordinated with the A-CC WMA. Contact Bob Case, [bcase@ag.co.contra-costa.ca.us](mailto:bcase@ag.co.contra-costa.ca.us).

6. It may make sense to have a staff member whose job is to coordinate invasive species efforts.

7. Management efforts may need to consider current efforts and mandates to control ground squirrels. Many covered species rely on a healthy population of ground squirrels as a resource or prey base. Complete elimination of livestock grazing tends to be detrimental to populations of ground squirrels. Ground squirrels are categorized as an agricultural pest. They also can damage foundations of buildings and other man-made structures. In some areas, land owners are required to control the abundance of ground squirrels. Poisons often are used to control ground squirrels. Certain poisons that are effective for killing ground squirrels have been banned; other poisons are less of a threat to other species. There is an organization that puts out recommendation for ground squirrel control—it may be helpful to obtain those recommendations.

8. The Panel asked whether there was a way for the HCP to question fire practices and air pollution restrictions at the regional level. This is a frustrating situation, and it is reasonable to question whether the HCP can make an attempt to affecting regional policies. At some point, regional policies will have to be reevaluated. Fuel reduction is of interest to virtually all stakeholders, and some Panel members do not think the HCP process should shy away from such issues. Large scale planning provides an opportunity in terms of moving beyond local-scale efforts like fuel reduction to minimizing the fire-prone urban-wildland interface in the first place. Of particular value in this regard would steering away from isolated subdivisions on ridges above wildland areas, which generally translate into mandated intense management of adjacent wildland areas—to the potential detriment of wildland values and often at taxpayers' expense.

9. The HCP also might be a mechanism to address issues related to regional water pollution, e.g. minimization of runoff into San Francisco Bay. At this level of planning, there is considerable potential to “make a difference” and to minimize threats to natural communities, including wetlands. Representatives from CDFG commented that they hope to look beyond vegetation communities. The agency is soliciting advice from scientific community regarding relationships between natural communities and air pollution and water pollution.

**• Do the preliminary draft alternative conservation strategies differ dramatically with respect to their potential biological benefits (or costs) for different covered species?**

The more management options available, the better. No single management alternative will be applicable broadly—i.e., applicable to numerous natural communities and covered species across an extensive area. It will be necessary to use multiple management methods, and to use those methods on a trial basis. This will require monitoring and revision of management practices in response to monitoring results, which means adaptive management will be necessary.

**• Do the preliminary draft alternative conservation strategies adequately address management needs specific to riparian areas?**

1. Current regulations generally require establishment of buffers of a given width (e.g., 200 meters from the stream bank), but there is not uniform scientific agreement about these numbers. Moreover, the most appropriate buffer width from an ecological perspective varies widely among locations. Also, the position from which the buffer width is measured is not trivial. Top of the bank is most common. Establishing a buffer of variable width probably is preferable from an ecological perspective, but this process tends to be quite complicated in practice.

2. In general terms, with respect to wildlife, most management strategies will be suitable for multiple species—there are few conflicts between species' needs. For example, the status of many species depends in large part on maintenance of a prey base of ground squirrels, large contiguous areas of grasslands, or maintenance of riparian areas. There is more complementarity in the conservation strategy than conflict. With respect to riparian areas, although buffer widths are arbitrary, maximization of vertical and horizontal vegetation structure can benefit many species.

3. Although maintenance and restoration of riparian areas is a good biological goal in a broad sense, relatively few projected impacts under the HCP will occur in riparian areas. Because few impacts will occur in riparian areas, the limited management focus (i.e. in the conservation strategies) on riparian areas is not a deficit in the plan.

4. One of the highest biological priorities for plants is preservation of alkali wetlands. If alkali grasslands and wetlands in the planning area are isolated from others outside the planning area, then preservation of those in the planning area becomes more important (Jones & Stokes clarified that there is a small preserve immediately south of our planning area in Alameda County).

**• What factors likely are limiting the population of kit fox in the inventory area? What alternative management techniques might be incorporated into the adaptive management plan to increase the abundance of kit fox in the inventory area?**

Historic reduction of ground squirrel populations (poisoning) probably is a primary reason why kit fox density in the inventory area is low. Increasing the prey base—especially ground squirrels—probably would benefit kit fox in the inventory area. It is not difficult to facilitate establishment of ground squirrels with habitat enhancements such as rock piles. It also would be useful to ensure that corridors are adequate for dispersal and / or occupancy, but that can be a daunting task. The HCPA Team should consider translocating kit fox into the inventory area if the corridors do not function as intended.

**• One of the goals of the conservation strategy with respect to San Joaquin kit fox is to ensure their movement between the existing core reserves through Zone 2 (Black Diamond Mines Regional Park and Cowell Ranch State Park/Los Vaqueros Watershed). A potential mechanism for achieving this goal is to develop a movement route through Briones Valley and through Deer Valley. Is this likely to be an effective approach?**

1. The best corridors for kit fox seem to be on the eastern side of the planning area, but those locations are subject to extensive development. The best remaining area may be Lone Tree Valley, furthest to the east, but this corridor is subject to the most development pressure. The Panel has been presented with several development scenarios. The scenario in Figure 5 might have considerable negative impacts on several corridors that would significantly impair movement of kit fox.

2. Development of the Byron Airport area is problematic because it is the main connection from Contra Costa County to the Bethany Reservoir area in Alameda County. Kit fox need some kind of corridor that will facilitate movement to habitat to the south of the planning area.

3. *Erodium macrophyllum* occurs in Deer Valley, so establishment of a corridor for kit fox there also could benefit this species.

4. The Round Valley area has a small and somewhat stable population of kit fox. If the reservoir expands and this western corridor is not protected, the population could be isolated.

5. Medusahead, a non-native invasive annual grass, has expanded dramatically in Round Valley. What effort might eradication efforts have on kit fox? Few eradication efforts have been successful; attempts usually have involved prescribed burning.

**• With respect to the same goal of ensuring movement of San Joaquin kit fox among areas of high-quality habitat, what is likely to serve as a barrier to kit fox movement?**

Golf courses are not necessarily a barrier, but red fox often colonize golf courses (capitalizing on availability of water), so kit foxes would be more likely to suffer predation in golf courses.

**• Are there specific management strategies and techniques that may help mitigate effects on silvery legless lizard and contribute to its recovery?**

The panel asked whether there are inland patches of sandy soil that potentially could support silvery legless lizard. The HCPA Team clarified that they have mapped all sandy soils, and that some patches were documented inland from the San Francisco Bay delta. The Panel recommended that these patches be checked for the presence of silvery legless lizard and potentially also for unusual species of plants (regardless of whether those plants are on the list of covered species). The panel also commented that silvery legless lizards do not have large area requirements and that some existing reserves may provide relatively high-quality habitat for the species.

**• Do you know of research on the effects of fire on Alameda whipsnakes or other snakes of fire-adapted communities that could help improve the conservation strategy for this species?**

1. Panel members commented that they would not recommend halting a prescribed fire if whipsnakes were present in the area, but it might be prudent to monitor whipsnakes closely or consider not applying fire in an area with a particularly high density of whipsnakes. It might be useful to conduct research on the seral stages at which colonization by whipsnakes is most likely.

2. U.S. Fish and Wildlife Service representatives noted that the Contra Costa County Water District has been conducting research on this issue. The Water District recently conducted a burn in an area inhabited by whipsnakes, and will be conducting follow-up studies on the effects of fire on the snakes.

**• Are there management techniques that you would recommend to be included in the menu of approaches available to preserve managers to benefit covered species of plants?**

1. Most of the plants that occur in chaparral are not likely to require substantial active management; periodic burning might be appropriate. Big Tarplant probably would benefit from livestock grazing; tarplant is unpalatable. Livestock grazing can adversely affect covered plant species in alkali flats.

2. In some cases the goals and objectives seem to suggest that grazing is categorically detrimental, yet grazing is part of some of the conservation strategies. Grazing may be useful for reduction of fire hazard, controlling non-native vegetation, and manipulating natural communities or habitat for covered species.

3. Several alternative management techniques, including burning, mowing, haying, and various experimental techniques that could be tested at a small scale, are not included in Conservation Measure 3.17.2. Most management techniques that create more open areas within annual grassland could benefit covered species of plants and lower the productivity of non-native grasses. Mowing, small burns, application of herbicides, and so forth all should be considered as potential tools to achieve biological goals and objectives, and should be included in measure 3.17.2 or in new measures.

4. “Livestock management” may be a more suitable title for a conservation measure than livestock exclosures per se. Exclusion of livestock grazing may not be beneficial for some covered species. Grazing trials, with appropriate monitoring and revision of management, could be part of the adaptive management strategy. The Panel suggested using three conservation measures: livestock management, burning, and other measures

5. Biological goals for all of the natural communities ideally should promote the full suite of native species appropriate to each community, to avoid the risk of losing native diversity to attrition.

6. The justification for the connection through Zone 1 to the Concord Naval Weapons Station should be expanded to include species other than kit fox. That area is probably not used, or would be used only rarely, by kit fox. But such a connection would be very important for species such as California tiger salamander or California red-legged frog.

7. It is important to maintain options to conserve areas used for dryland agriculture, including easements. Supporting easements on grazing lands and ranch lands within or near the inventory area may be useful for maintaining grazing as a management option.

## **ADAPTIVE MANAGEMENT**

**• What hypotheses are most relevant to address, and what hypotheses can be addressed most effectively, through the process of adaptive management? What objectives are appropriate from the perspective of broad conservation goals, our ability to achieve these objectives, and our ability to assess whether the objectives are being met in an adaptive management framework?**

1. The Panel could come up with a list of hundreds of hypotheses, but this is the wrong approach to take before some of the more general questions about adaptive management have been answered. All of the research efforts must be placed in context of how those efforts will help us make decision about resources in the planning area.

2. The Panel emphasized that the issue of who will be conducting the adaptive management plan is crucial. Everything in the adaptive management strategy, all issues with respect to adaptive management, are qualified by who is in charge of the plan. The Panel is reluctant to consider what objectives are appropriate until they are convinced that there are elements on an adaptive management framework in place that could work. Some concerns were raised that consideration of adaptive management is coming too late in the HCP process, and this could be a major impediment to successful achievement of plan objectives. What adaptive management means for governments and agencies is power-sharing and that is what they don't want to do, share power with science.

3. All stakeholders must "buy into" the process of adaptive management early in order to make adaptive management effective in the long run. Many stakeholders are comfortable with the planning process because it is familiar, but using science to make a decision about a process down the road is not familiar. To what extent have officials been informed about adaptive management or to what extent do they understand the process?

4. The question of who will be conducting monitoring and who will deciding whether and how to adjust management is extremely important, even at this stage. Inevitably money and personnel are available to meet development goals long before money and personnel are available to meet goals for conservation. An institutional "home" for the adaptive management program should be established as early as possible in the process. Ideally the home should not be located within the California Department of Fish and Game because so few personnel typically are available. There are few successful examples in which staff with little scientific training have been able to

implement an adaptive management program effectively (the Panel was only aware of one such example—an adaptive management program for the Karner blue butterfly).

5. The HCPA Team commented that the HCP includes a great deal of leeway with respect to administration and implementation of an adaptive management program. For example, alternatives include both capitalizing on an existing institution or creating a new institution to acquire preserves and administer the adaptive management program. Costs associated with all options are estimated.

6. Perhaps the most substantial hypothesis implicit in the plan is that certain mitigation techniques are likely to compensate for take. In the process of adaptive management, it may be valuable to prioritize for trials and monitoring (1) species that are the most highly endangered and (2) situations in which there is considerable potential for management to improve the status of covered species and natural communities. It also may be useful to assign a high priority to species with relatively short lifespans or those with considerable demographic variability.

7. A suitable framework for hypotheses could relate to the effects of individual management strategies on the status of covered species (e.g., the strategy increases abundance of the species, decreases abundance, or has no effect).

8. Success criteria may vary as a function of spatial scale. At a relatively local scale, objectives might include increasing the abundance of an individual species. At a larger scale, it might be more appropriate to concentrate on maximizing the proportion of native species with the assumption or hope that rare species will tend to benefit from this strategy.

9. The Panel questioned whether kit foxes are likely to remain viable in the planning area. The success of the plan should not rely on persistence of kit fox. Persistence may be influenced by factors outside the planning area and the plan should not be judged a failure if kit fox decline.

10. Managing for diversity of native species means managing against non-natives in areas where there is least risk of irreversible damage and greatest likelihood of a favorable outcome (annual grasslands, for example). At relatively large scales, however, grasslands tend to be relatively stable and are not at great risk. It is important, however, to keep an eye on specific natural communities. Threats to alkali wetlands, including perennial peppergrass and other non-native species, should be monitored.

11. Adaptive management is a continuum. We have considerable experience managing some species, such as burrowing owls, but the plan needs a mechanism to adjust management if objectives are not being met. Little is known about the effects of management on some of the covered species. It may be useful to identify areas that might be less dynamic, and areas that require more attention in an adaptive program.

12. Mitigation directed toward certain species may not be appropriate. For example, efforts to mitigate for California tiger salamanders by netting and relocating efforts at ponds may not be effective and could represent a waste of money. At any given time, the bulk of the population is located in the uplands surrounding the ponds. Mitigation efforts may be more effective if they

included drift fences and pitfall traps to capture adults in the uplands. Mitigation is a challenging objective.

13. Similarly, salvage of plants rarely is successful. If plants are likely to be destroyed by development, then it may make sense to attempt salvage. Or, the plants that are likely to be destroyed could be harvested as a seed source for areas in which managers are trying to control invasive non-native species or to establish new populations.

## **APPENDIX 1**

### **PRINCIPLES FOR ADAPTIVE MANAGEMENT AND ASSOCIATED MONITORING**

Adaptive management is an iterative process that evaluates management actions or program elements through carefully designed monitoring and proposes subsequent modifications (Muller et al. 2000). The modifications are in turn tested by appropriate, perhaps redesigned, monitoring. Although adaptive management is logical, can deal with uncertainty and data gaps, and is similar to the scientific process of hypothesis testing, there are few examples of its successful implementation in the existing literature (but see Wisconsin DNR 1999 for a fully-operating example). Although many reasons for the limited success of adaptive management can be cited, there appear to be two main reasons: (1) reluctance of planners or resource managers to rely on monitoring data for decision-making and (2) monitoring programs are not specifically focused on the management actions or lack the statistical power to provide the necessary level of “comfort” or certainty to assure managers using the conclusions. Therefore, implementing an effective program for adaptive management and monitoring in eastern Contra Costa County requires understanding the following principles.

1. Policy-makers, resource managers and scientists must collaborate on the design of the adaptive management program from day one

Initial “buy-in” as to how adaptive management works is absolutely essential so that policy makers and resource managers understand how the monitoring program should be used and how it cannot be used. They must specify which management actions most urgently require evaluation, provide focus on specific issues to be included in the monitoring, and understand how monitoring will provide the necessary data for modifying the existing action or proposing a new action. Similarly, scientists must understand the policy and management needs, explain the design and limits of proposed monitoring efforts (for example, error and power analyses), and provide useful interpretation of the monitoring data for decision-making.

2. Different types of monitoring programs provide distinctively different services

“Monitoring” is too vague a term to convey the kinds of designs and information feedbacks that will be required for implementing an adaptive management program for all of eastern Contra Costa County. Therefore, effective implementation of the NCCP/HCP will require three types: compliance monitoring, status and trend monitoring, and cause and effect monitoring.

- a. Compliance monitoring. This is a simple information feedback on fulfillment of permit conditions, mitigations, rates of land conversion, spatial patterns of development, preservation, or other forms of land use, and other non-biological measures are recorded and analyzed. In essence, compliance monitoring tracks whether the most basic objectives of the HCP / NCCP are being met. The county of Contra Costa, through its planning department, is probably the most suitable organization to provide compliance monitoring for the eastern Contra Costa County HCP / NCCP.

b. Status and trend monitoring. Biological data on population sizes, number of populations, spatial extent, or quality of critical biological resources are subjected to trend analysis to determine how these variables are responding under the existing conditions imposed by the NCCP/HCP or under specific management regimes. Although agencies will probably require some kind of status assessment on all listed or CEQA species, the selection of indicator species or habitat types may provide a reasonable subsample of different organisms or community types for more detailed trend analysis. Status and trend monitoring does not establish cause and effect, but simply gives an evaluation of resource condition through time. Consequently, its statistical power must be appropriately evaluated to give managers clear indications of its limitations and levels of uncertainties. Resource agencies such as CDFG and USFWS have the appropriate expertise and databases for performing this type of monitoring in cooperation with the East Contra Costa County HCP / NCCP. Principles and techniques of trend analysis are given in Pavlik (1994), Willoughby et al. (1997), and Thompson et al. (1998).

c. Cause and effect monitoring: This is the most scientific of the three types of monitoring because it tests management hypotheses with field experiments. It attempts to fill specific data gaps by testing the effects of relevant variables (e.g., controlled burns, grazing regimes, reintroductions of rare species) on resources of concern. A well-designed experiment with appropriate controls, replication, and statistical power can provide the best management guidance, but such experiments are specialized, time-consuming, and relatively expensive. Consequently, this type of research-oriented monitoring is most likely to be performed by qualified consultants or university scientists supplied with adequate levels of funding. The principles and techniques of cause and effect monitoring are discussed in Taylor and Gerrodette (1993), Pavlik (1994), Willoughby et al. (1997), Thompson et al. (1998) and Feinsinger (2001).

### 3. Oversight committees must facilitate communication among government, scientists, and the private sector

Information flows between decision-making bodies and constituencies must be facilitated to promote the synergy necessary for successful adaptive management. Various structures can be proposed (Pavlik et al 2002), but efficient and timely exchange of information between policy makers, researchers, and managers must be of primary concern. A technical advisory group (TAG) should consist of policy makers, resource managers, and scientific representatives that are responsible for the adaptive management program. Data from the various monitoring programs should flow back to the TAG, which recommends management alternatives or modifications to the HCP / NCCP. Recommendations of the latter sort should feed back from the TAG to a broader HCP / NCCP oversight group with more comprehensive representation (agencies, university officials, local government, development and agricultural interests) and the power to redirect or modify development or preservation activities.

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## **APPENDIX 2**

### **PUBLIC COMMENT**

#### **Biological goals and habitat models**

1. (Brad Olson) The Panel raises good points about the relationship between invasion of non-native species and management of reserve areas. Much of the planning area been colonized by non-native species, and the threats to native species and communities could increase. In addition, some non-native species may be considered acceptable. Absolute goals are unwise.
2. (Brad Olson) Burning is an important and practical management tool. Yet implementation of prescribed fire is difficult in the east San Francisco Bay Area. No fire district in the East Bay has a let-burn policy, and the Bay Area Air Quality Management District allows very few burn days a year. The potential for fire to serve as a large-scale landscape management tool is greatly limited without major policy change. Fire needs to be considered in the context of its availability.
3. (Peter Rausch) The concept of a buffer for riparian corridors needs to be elaborated. From where should 200 feet be measured?
4. (Peter Rausch) A new article by Carla D'Antonio and others may have useful new information on the ecology, management, and restoration of native grasslands. This manuscript includes a summary and analysis of existing literature that offers valuable insight into our understanding of grassland dynamics.

#### **Conservation strategy**

1. (Brad Olson) With respect to the long-term viability of kit fox, connections between the planning area and the bulk of remaining kit fox habitat to the south of the planning area seems to be in jeopardy. Livermore is considering rebuilding a highway interchange, non-native star thistle is expanding, populations of ground squirrels are being lost. Can the HCP minimize the possibility that kit fox north of I-580 will become reproductively isolated?

Sue Orloff commented that developing effective corridors of the appropriate width would go a long way toward providing the connectivity needed to sustain long-term viability. Widening the Lone Tree corridor to an average width of about one mile would provide the most effective connection. Some of the proposed corridors already have planned developments in the middle of the corridors.

2. (Peter Rausch) Is it appropriate to assume that the current distribution of chaparral is “natural”? Does this type of vegetation provide resources or habitat for some covered species? (The Panel commented that because the historical extent of chaparral in the inventory area is not known, the current extent is a reasonable starting point or baseline. The Panel interpreted the current goals and objectives for chaparral and scrub as “no take” rather than as a limit on further expansion of this vegetation type. The Panel also commented that the current conservation strategy does not preclude expansion of shrubs. The area occupied by shrubs may increase considerably in locations in which livestock grazing and fire are absent, or the extent of shrub

cover may be limited by edaphic factors. Examples of both exist in the vicinity of the inventory area. Moreover, species differ in their dispersal and colonization abilities.

## **Additional comments submitted by Peter Rausch**

### **1. Chapter 1, page 2**

“This HCP/NCCP includes 5 natural communities, called vegetation communities because they are defined in terms of their vegetation composition (as opposed to wildlife or other composition). The term natural community is also avoided because agricultural lands are not "natural" but they provide important habitat for some covered species.”

This HCP/NCCP does NOT include 5 NATURAL communities. It includes 5 communities (for the very reason that is argued in the Chapter 1 statement above). The language should be made fully consistent with the point being put forth that not all the “communities” are “natural”. Perhaps also, the HCP/NCCP should address—for the purpose of definition and clarity—the use of the terms “native” vis a vis “natural.” E.g., are they for all intents and purposes used as synonyms? If not, then how is each term intended to be employed and understood throughout the HCP/NCCP plan?. The notion that “habitat” is important if it provides covered (native) species even if that habitat is not “natural” begs of the “zoo” concept of habitat. Is this a slippery slope of attending to “covered species” instead of using covered species to attend to the larger and important business of protecting native/natural communities?

### **2. Chapter 1, page 3**

“Objective 1.11a: Avoid impacts on wetlands from covered activities to the maximum extent practicable. Minimize adverse effects on wetlands from covered activities to the maximum extent practicable.”

Here and throughout the HCP/NCCP plan (presumably), the notion “to the maximum extent practicable” is used. This notion can have common sense, legal, and counter-intuitive meanings, depending on the situation in which it is being evaluated and on who is doing the interpretation. What intended meaning(s) are to be understood for the purposes of this HCP/NCCP, for this notion?

### **3. Science Advisory Panel Agenda for 26 February 2003**

“Adaptive management” is a major theme of both this SAP meeting and of the HCP/NCCP plan. Is Adaptive Management explicated in the plan in sufficient detail for all concerned parties to understand just what it is; what its weaknesses are especially in using the notion of Adaptive Management to put off until tomorrow what should be properly addressed today; what is implied for the future resource managers and land owners when they must deploy the Adaptive Management strategy; what is the range of relationships (or disconnects) between Adaptive Management and “no surprises”? What is the relationship of (or confusion, if any, between) “adaptive management” (mentioned once) and “appropriate/improved/changed” “management” “plans/needs” mentioned throughout chapter 1, for example? And, what explicit adaptive management structure(s) and mechanism(s) are intended for this HCPA implementation—where does the authority come from; the resources? How is this HCP/NCCP going to address the (lack of) timeliness which will be inherent in this plan if too much reliance is put on (future) adaptive

management learning, and too little is put on front-loaded investment in “belt and suspenders” planning—i.e., just how formal and robust will this plan make its investment in Adaptive Management, and what is being done to avoid under-specifying the plan’s initial reach (e.g., asking the SAP on Feb 26 to spot possible problems; but, what more?), hoping that (future) adaptive management will in fact not fail to provide fixes to such under-specified initial conditions?

#### 4. Chapter 1, page 3

“Objective 1.41c: Stock ponds lost to covered activities will be compensated through preservation, restoration, and creation of ponds of equal or greater extent and function than those ponds lost.”

Is it the intent of this objective to include the “intent” of replacing the function of providing water to stock? Or, is the HCPA intending to provide only for the lost “natural/native” environmental values provided by the lost ponds?